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ABSTRACT

Earlier studies had shown that differences in measured interests are related to differences in scores on tests of academic ability. Specifically, scores on the college major interest scales of the Kuder Occupational Interest Survey (KOIS) were found to be related to scores on the National Merit Scholarship Qualifying Test (NMSQT). This suggested that a scale could be developed on the KOIS that might relate to academic ability. The NMSQT scores for a sample of 5,000 males were divided into high and low scoring groups. The differences in responses of these two groups to the items on the KOIS were used to develop a scale called academic ability. In a cross validation, the scores on this scale correlated .60 with NMSQT results, suggesting that the scale might be useful for counseling purposes. (Author)

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DEVELOPING AN ACADEMIC ABILITY SCALE

FOR THE KUDER OCCUPATIONAL INTEREST SURVEY

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Paper presented at
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ACADEMIC ABILITY SCALE DEVELOPMENT

An Academic Ability Scale was developed for the Kuder Occupational Interest Survey (KOIS) to see if there was any meaningful relationship between a high school student's interest (as measured by the KOIS) and his academic aptitude (as measured by the National Merit Scholarship Qualifying Examination - NMSQT). Since data was available for students in 21 high schools in and around Philadelphia for both KOIS (Fall '67) and NMSQT (Spring '68), samples were chosen from this population. From the results of the study described below, it is shown that interests and academic aptitudes are in fact related (at least for males).

Student names were matched within each school on the KOIS and NMSQT listings and the NMSQT scores were posted on the KOIS listings. After eliminating students with a V score of less than 46 and/or more than 4 missing responses on KOIS, the students were classified into upper, middle, and lower groups according to the NMSQT national norms for college-bound students for 1968. Samples were then drawn for each sex to form the following six groups.

<u>GROUP</u>	<u>Xile RANGE</u>	<u>NMSQT SCORE</u>	<u>MALES</u>	<u>FEMALES</u>
Upper	68 and above	115 or above	150	150
Middle	35 to 67	96 to 114	75	75
Lower	34 and below	95 or below	75	50
Description & N of samples chosen				

One hundred students were then selected at random from each of the upper groups and used to form frequency tables based on the students' 100 KOIS "position pattern" choices. Similar tables were created for the two lower groups and all four tables were converted to percents to reflect the proportion of students choosing each of the six "position pattern."

The frequency tables formed from the lower groups were then subtracted (cell by cell) from the frequency tables formed from the upper groups. (The resulting two matrices -- one for each sex -- were referred to as difference matrices.) The remaining fifty students were combined with the middle and lower groups for each sex and KOIS scores were created for all 200 students. (KOIS score here refers to the sum of the 100 numbers selected row-by-row from the columns (in the difference matrix) matching each of the student's "position pattern" choices. Thus a positive score would indicate interests closer to the upper group and a negative score would indicate interests closer to the lower group.) The KOIS scores were then correlated with NMSQT scores for each sex and produced correlation coefficients of .66 and ____ respectively for males and females.

Noting that the lower groups were used both in building the difference matrices and as part of the students that were scored, a group of 75 males and a group of 75 females were randomly selected from the remainder of the population to cross-validate the results. Both groups were scored as described above by their respective difference matrices and the resulting scores were correlated with corresponding selection scores. The correlation coefficients this time were .60 for males and ____ for females.

A linear regression equation was established for each sex and the standard error of estimate was found to be 16.76 for males and ____ for females when predicting NMSQT selection scores from KOIS scores for the two validation groups. (See the attached table for the results.)

The statistical results for females were purposely left out because they were not nearly as encouraging as the males and past studies have shown that this should not have been the case. On the contrary, it was expected that the female correlations would have been higher than the males and the standard error of regression lower.

SAMPLE PROCEDURE LAYOUT

I. STUDENT RESPONSE DATA TO THE KUDER OCCUPATIONAL INTEREST SURVEY

	PAT	TEBBY	MICKY	MARY	JACKIE	LEE	CHRIS	ROBIN	KIM	JILL
	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML
1. Introduce a stranger to people at a large party	00	00	00	00	00	00	00	00	00	00
Introduce a stranger to people at a small party	00	00	00	00	00	00	00	00	00	00
Let someone else make the introduction	(X)	00	(X)	00	00	00	00	00	00	00
2. Collect the signatures of famous people	00	00	00	00	00	00	00	00	00	00
Collect butterflies	(X)	00	00	00	00	00	00	00	00	00
Collect pieces of different kinds of wood	00	(X)	00	00	00	(X)	00	00	00	00
3. Go on expeditions to find rare animals	00	00	00	(X)	00	00	00	00	00	00
Go on expeditions to find diseases among natives	00	00	00	00	(X)	00	(X)	00	00	00
Do welfare work	00	(X)	(X)	00	00	00	00	00	00	00
4. Work where no one can watch you	00	00	00	00	00	00	00	00	00	00
Work where only one or two people can watch you	00	00	00	00	00	00	00	00	00	00
Work where many people can watch you	00	00	00	00	00	00	00	00	00	00
5. Have good health	00	00	00	00	00	00	00	00	00	00
Have good friends	00	00	00	00	00	00	00	00	00	00
Have high social position	00	00	00	00	00	00	00	00	00	00
6. Play a game that requires mental arithmetic	(X)	00	00	(X)	00	00	00	00	00	00
Play checkers	00	(X)	(X)	00	00	00	00	00	00	00
Work mechanical puzzles	00	00	00	00	(X)	00	00	(X)	00	00
7. Go to a famous night club	00	00	00	00	00	(X)	00	00	00	00
Go to an amusement park	(X)	00	(X)	00	00	00	(X)	00	00	(X)
Go to a party for a famous person	00	00	00	(X)	(X)	00	00	(X)	(X)	00
8. Travel from place to place harvesting crops	00	(X)	00	00	00	(X)	(X)	00	(X)	00
Work in a factory	00	00	00	(X)	00	(X)	00	00	00	(X)
Perform in a circus	(X)	00	(X)	(X)	(X)	00	00	00	00	00
9. Take a broken lock apart to see what is wrong	00	00	00	00	00	00	00	00	00	00
Look for errors in the typewritten copy of a report	00	00	00	00	00	00	00	00	00	00
Add columns of figures	00	00	00	00	00	00	00	00	00	00
10. Visit an exhibit of famous paintings	00	00	00	00	00	00	00	00	00	00
Visit an exhibit of various means of transportation	00	00	00	00	00	00	00	00	00	00
Visit an exhibit of laboratory equipment	00	00	00	00	00	00	00	00	00	00

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II. POSITION PATTERN NUMBERS

1 = P ₁ + P ₅	4 = P ₂ + P ₆	M	L
2 = P ₁ + P ₆	5 = P ₃ + P ₄	1 0	4 0
3 = P ₂ + P ₄	6 = P ₃ + P ₅	2 0	5 0
		3 0	6 0

III. STUDENT RESPONSE DATA (POSITION PATTERN NUMBERS)

STUDENT	ITEM NUMBER									
	1	2	3	4	5	6	7	8	9	10
Pat	1	5	5	6	3	4	5	1	1	4
Terry	5	1	3	1	3	5	4	6	6	4
Mickey	1	4	3	5	6	5	2	1	5	2
Marty	2	2	6	4	3	4	3	2	6	2
Jackie	3	5	2	1	1	3	1	3	4	6
Lee	4	3	3	6	4	6	4	2	3	5
Chris	2	3	2	3	6	4	2	4	4	1
Robin	6	1	5	5	5	1	1	5	6	4
Kim	5	5	6	6	2	2	3	4	4	6
Jan	3	6	2	3	4	3	2	2	1	4

IV. FREQUENCY MATRIX - UPPER GROUP

ITEM	POSITION PATTERN NUMBERS					
	1	2	3	4	5	6
1	2	0	0	0	1	0
2	1	0	0	1	1	0
3	0	0	2	0	1	0
4	1	0	0	0	1	1
5	0	0	2	0	0	1
6	0	0	0	1	2	0
7	0	1	0	1	1	0
8	2	0	0	0	0	1
9	1	0	0	0	1	1
10	0	1	0	2	0	0

V. FREQUENCY MATRIX - LOWER GROUP

ITEM	POSITION PATTERN NUMBERS					
	1	2	3	4	5	6
1	0	0	1	0	1	1
2	1	0	0	0	1	1
3	0	1	0	0	1	1
4	0	0	1	0	1	1
5	0	1	0	1	1	0
6	1	1	1	0	0	0
7	1	1	1	0	0	0
8	0	1	0	1	1	0
9	1	0	0	1	0	1
10	0	0	0	2	0	1

VI. DIFFERENCE MATRIX*

ITEM	POSITION PATTERN NUMBERS						Pat's score
	1	2	3	4	5	6	
1	2	0	-1	0	0	-1	2
2	0	0	0	1	0	-1	0
3	0	-1	2	0	0	-1	0
4	1	0	-1	0	0	0	0
5	0	-1	2	-1	-1	1	2
6	-1	-1	-1	1	2	0	1
7	-1	0	-1	1	1	0	1
8	2	-1	0	-1	-1	1	2
9	0	0	0	-1	1	0	0
10	0	1	0	0	0	-1	0
							8

* The upper and lower matrices were converted to percents before this matrix was formed in the original study.

VII. STUDENT SCORES (ORIGINAL GROUP)

STUDENT	DIFFERENCE MATRIX SCORE	NMSQT SCORE	PREDICTED NMSQT SCORE	DIFFERENCE
Pat	8	128	120	8
Terry	9	124	122	2
Hickey	12	118	129	-11
Marty	1	112	105	7
Jackie	-5	101	92	9
Lee	0	100	103	-3
Chris	-2	98	98	0
Robin	-5	93	92	1
Kim	-7	84	88	-4
Jan	-7	78	88	-10

$$r = .91$$

VIII. STUDENT SCORES (VALIDATION GROUP)

STUDENT	STUDENT DIFFERENCE MATRIX SCORE	NMSQT SCORE	PREDICTED NMSQT SCORE	DIFFERENCE
Henry	-8	90	85	+5
Larry	10	116	124	-8
Jim	2	95	107	-12
Sam	-3	92	96	-4
Pete	3	113	109	+4

$$Y = .865$$

MALE VERIFICATION

X	Kuder Score. MAT1	Y	Actual NMS SS.	Yc	Est NMS	Yc-Y
-50		87		86.90415813		-0.09584187019
-338		60		60.17828455		0.1782845456
175		108		107.7837469		-0.2162531325
178		107		108.0621414		1.062141384
5 155		107		105.9277834		-1.072216576
-109		80		81.42906597		1.429065972
-75		83		84.58420383		1.584203826
57		95		96.83356255		1.833562552
-563		74		76.41796467		2.417964675
10 -180		72		74.84039575		2.840395748
-50		84		86.90415813		2.90415813
66		101		97.6687461		-3.331253899
-65		89		85.51218555		-3.487814453
108		98		101.5662693		3.566269332
15 89		104		99.80310406		-4.196895939
-16		98		93.02883749		-4.971162507
-14		85		90.24489233		5.244892328
55		102		96.64796621		-5.352033793
225		107		112.4236555		5.423655476
20 -76		79		84.49140565		5.491405653
-14		87		92.84324115		-5.843241149
-15		96		90.15209416		-5.847905844
6		98		92.10085577		-5.899144229
-19		96		89.78090147		-6.219098533
25 -63		92		85.69778189		-6.302218108
228		106		112.70205		6.702049992
-5		98		91.08007588		-6.919924123
1		99		91.63686491		-7.36313509
-217		64		71.40686338		7.406863378
30 -151		85		77.53154274		-7.468457259
-1		99		91.45126857		-7.548731434
41		103		95.3487918		-7.651208203
77		91		98.689526		7.689525995
-48		95		87.08975447		-7.910245526
35 -18		102		93.21443384		-8.785566163
-90		92		83.19223124		-8.807768757
86		109		99.52470954		-9.475290455
34		85		94.69920459		9.699204592
-59		76		86.06897458		10.06897458
40 -163		117		106.6701688		-10.3298312
-191		63		73.81961585		10.81961585
15		82		92.93603932		10.93603932
93		89		100.1742967		11.17429675
-90		95		83.19223124		-11.80776876
45 -133		117		103.8862236		-13.11377636
-15		77		90.15209416		13.15209416
333		109		122.4458581		13.44585807
-168		62		75.95397381		13.95397381
-253		54		68.06612918		14.06612918
50 -90		69		83.19223124		-14.19223124
-98		68		82.44984587		-14.44984587
224		128		112.3308573		-15.6691427
222		96		112.4458581		-15.6691427

VERIFICATION GROUP

50	84	74.84039575	2.840395748
66	101	86.90415813	2.90415813
65	89	97.6687461	3.331253899
108	98	85.51218555	3.487814453
15 89	104	101.5662693	3.566269332
16	98	99.80310406	4.196895939
14	85	93.02883749	4.971162507
55	102	90.24489233	5.244892328
225	107	96.61796621	5.352033793
20 76	79	112.4236555	5.423655476
14	87	84.49140565	5.491405653
15	96	92.84324115	5.843241149
6	98	90.15209416	5.847905844
19	96	92.10085577	5.899144229
25 63	92	89.78090147	6.219098533
228	106	85.59778189	6.302218108
5	98	112.70205	6.702049992
1	99	91.08007588	6.919924123
217	64	91.63686491	7.36313509
30 151	85	71.40686338	7.406863378
1	99	77.53154274	7.468457259
41	103	91.45126857	7.548731434
77	91	95.3487918	7.651208203
48	95	98.689526	7.689525995
35 18	102	87.08975447	7.910245526
90	92	93.21443384	8.785566163
86	109	83.19223124	8.807768757
34	85	99.52470954	9.475290455
59	76	94.69920459	9.699204592
40 163	117	86.06897458	10.06897458
191	63	106.6701688	10.3298312
15	82	73.81961585	10.81961585
93	89	92.93603932	10.93603932
90	95	100.1742967	11.17429675
45 133	117	83.19223124	11.80776876
15	77	103.8862236	13.11377636
333	109	90.15209416	13.15209416
168	62	122.4458581	13.44585807
253	54	75.95397381	3.95397381
50 90	59	68.06612918	1.06612918
98	58	83.19223124	14.19223124
224	128	82.44984587	14.44984587
222	96	112.3308573	15.6691427
280	82	112.145261	16.14526096
55 150	61	65.56057853	16.43942147
33	106	77.62434091	16.62434091
17	110	88.48172706	17.51827294
232	91	89.96649781	20.03350219
4	70	70.0148908	20.9851092
60 70	107	91.17287405	21.17287405
81	62	85.04819469	21.95180531
122	58	84.02741479	22.02741479
70	62	80.22268973	22.22268973
6	116	85.04819469	23.04819469
65 70	122	92.10085577	23.89914423
189	99	98.03993879	23.9606121
81	74	74.0052122	24.9947878
208	102	99.06071868	25.06071868
8	62	72.24204693	29.75795307
70 61	55	92.28645212	30.28645212
118	68	85.88337824	30.88337824
89	135	102.4942511	34.49425105
73	134	99.80310406	35.19689594
158	143	98.31833331	35.68166669
75 32	57	106.2061779	36.79382206
		94.51360825	37.51360825

ACADEMIC ABILITY SCALE DEVELOPMENT

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The NMSQT scores for a sample of 5000 males were divided into high and low scoring groups. The differences in responses of these two groups to the items on the KOIS were used to develop a scale called academic ability. In a cross validation, the scores on this scale correlated .60 with NMSQT results, suggesting that the scale might be useful for counseling purposes.

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